

CLAIMS

What is claimed is:

1. A fabrication method comprising the steps of  
providing a first component and a second component;  
positioning the first component in facing-but-spaced apart relation to the  
second component;  
5 placing a bonding medium between the first component and the second  
component, the bonding medium comprising  
at least two malleable spheres made of a metal that bonds to both  
the first component and to the second component when subjected to a sufficiently  
large force, and  
10 a quantity of an uncured adhesive; thereafter  
bonding the first component to the second component using the bonding  
medium, the step of bonding including the steps of  
supplying a bonding apparatus having at least one force actuator;  
the bonding apparatus pressing the first component against the  
15 second component in a facing-but-spaced-apart relation, with the bonding medium  
therebetween, with a sufficient bonding force to bond the malleable spheres both  
to the first component and to the second component, simultaneously  
monitoring at least one measured bonding reaction of the first  
component and the second component, and simultaneously  
20 controlling the bonding apparatus responsive to the step of  
monitoring, and thereafter  
curing the adhesive.
2. The method of claim 1, wherein the step of controlling includes the  
steps of  
providing a set of bonding reaction limitations,  
comparing the at least one measured bonding reaction with the respective  
5 set of bonding reaction limitations, and

sending control signals to the at least one force actuator responsive to the step of comparing.

3. The method of claim 2, wherein the step of providing a set of bonding reaction limitations includes the steps of

evaluating a set of stresses that cause damage to the first component, and  
selecting the set of bonding reaction limitations responsive to the step of  
5 evaluating the set of stresses.

4. The method of claim 1, wherein the steps of placing and the bonding apparatus pressing include the steps of

positioning the first component and the second component in a facing  
relationship in the bonding apparatus,  
5 dispensing the adhesive between the first component and the second  
component,

positioning the spheres in the adhesive,  
bringing the first component and the spheres, and the second component  
and the spheres, into touching contact with each other, and  
10 forcing the first component toward the second component with sufficient  
force to bond the spheres to the first component and to the second component.

5. The method of claim 1, wherein the step of controlling includes the step of

determining a set of maximum stresses applied to the first component.

6. The method of claim 1, wherein the step of providing a first component and a second component includes the steps of  
providing a sensor chip assembly first component.

7. The method of claim 1, wherein the step of providing a first component and a second component includes the steps of  
providing a sensor chip assembly first component, and

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providing a mounting platform second component.

8. The method of claim 1, wherein the step of the bonding apparatus pressing includes the step of the bonding apparatus loading according to a preselected load profile.

9. The method of claim 1, wherein the step of placing a bonding medium includes the steps of furnishing spheres comprising a metal selected from the group consisting of indium, tin, germanium, and gold.

10. The method of claim 1, wherein the step of curing the adhesive includes the step of removing the bonding force prior to completion of full curing of the adhesive.

11. A fabrication method comprising the steps of providing a first component and a second component; providing a bonding medium comprising at least two malleable spheres made of a metal that bonds to both the first component and to the second component when subjected to a sufficiently large force, and a quantity of an uncured adhesive; bonding the first component to the second component using the bonding medium, the step of bonding including the steps of supplying a bonding apparatus having at least one force actuator, positioning the first component and the second component in a facing relationship to each other in the bonding apparatus, dispensing the adhesive between the first component and the second component, positioning the spheres in the adhesive, thereafter bringing the first component, the second component, and the

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spheres into touching contact with each other,

the bonding apparatus forcing the first component toward the second component with sufficient force to bond the spheres to the first component and to the second component to form an assembly,

20 monitoring at least one measured bonding reaction of the first component and the second component,

controlling the bonding apparatus responsive to the step of monitoring, the steps of forcing, monitoring, and controlling being performed 25 simultaneously, and thereafter

curing the adhesive.

12. The method of claim 11, wherein the step of controlling includes the step of

providing a set of bonding reaction limitations,

5 comparing the measured bonding reactions with the respective set of bonding reaction limitations, and

sending control signals to the at least one force actuator responsive to the step of comparing.

13. The method of claim 12, wherein the step of providing a set of bonding reaction limitations includes a step of

evaluating a set of stresses that cause damage to the first component, and

5 selecting the set of bonding reaction limitations responsive to the step of evaluating the set of stresses.

14. The method of claim 11, wherein the step of controlling includes the step of

determining a set of maximum stresses applied to the first component.

15. The method of claim 11, wherein the step of providing a first component and a second component includes the steps of

providing a sensor chip assembly first component.

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method of claim 11, wherein the second component includes the sensor chip assembly first connected to the mounting platform second component.

17. The method of claim 11, wherein the step of the bonding apparatus pressing includes the step of the bonding apparatus loading according to a preselected load profile.

18. The method of claim 11, wherein the step of placing a bonding medium includes the steps of

furnishing spheres comprising a metal selected from the group consisting of indium, tin, germanium, and gold.

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at least two malleable spheres made of a metal selected from the group consisting of indium, tin, germanium, and gold, and  
a quantity of an uncured adhesive;

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- the bonding apparatus pressing the sensor chip assembly against the mounting platform, with the bonding medium therebetween, with a sufficient bonding force to bond the malleable spheres both to the sensor chip assembly and to the mounting platform to form an assembly, simultaneously
- 15 monitoring at least one measured bonding reaction of the sensor chip assembly and the mounting platform, and simultaneously controlling the bonding apparatus responsive to the step of
- 20 monitoring, and thereafter curing the adhesive, the step of curing the adhesive including the steps of
- removing the bonding force prior to completion of full curing of the adhesive, and
- 25 removing the assembly from the bonding apparatus.

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